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THE SURGEON GENERAL

SECRET

7959/B22 DATE APR 10 1950  
MAJOR FRANK B. ROGERS, MO  
Historical Division

Frank B. Rogers

Vol. II No. 2

Malaria Control, Hq. ASCOM, APO 358

30 Jan 1945

The following extract of a letter from the Surgeon General should prove gratifying to all malaria personnel. Recognition of the services rendered by malaria control and survey units have been given from many sources but none are more welcome than this one from the Surgeon General.

COPY:

R E S T R I C T E D

WAR DEPARTMENT  
Services of Supply  
Office of The Surgeon General  
Washington  
25

21 December 1944

Air Mail

SUBJECT: Malaria rates

TO: Commander-in-Chief, U. S. Army Forces in the Far East.

(Attention: Surgeon)

1. The striking reduction in the malaria rate in the Southwest Pacific area during the past year is noted with great satisfaction. Commendation is extended for the effective control of this important disease despite the unfavorable environmental situation. It is hoped that this excellent record will be maintained as new malarious areas are invaded.

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ARMED  
FORCES  
SEP 10 1952  
NORMAN T. KIRK  
Major General, U. S. Army  
The Surgeon General  
BRARY

R E S T R I C T E D

It is interesting to consider the little known occupational hazards of malaria control. Few, outside of malaria workers, realize that though primarily non-combatant troops, malaria control and survey personnel are constantly risking life and limb in the pursuit of their duties. Many units have been called upon to fill in as combat troops and have proven themselves worthy of any emergency. Purple Hearts have been awarded throughout the entire theater to men of the various units.

The most unusual accidents, however, have occurred, not as a result of enemy action, but as a result of environmental conditions.

Many of us recall the incident wherein one unit CO was attacked and badly injured by a man-eating crocodile in the Cape Gloucester area.

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There have been numerous cases reported of malaria workers in the field being attacked by wild pigs and other denizens of the jungle while engaged in malaria control and survey work.

Of course, all Army personnel are liable to the same risks but in as much as malaria control calls for extensive work in areas remote from civilization, surely we can consider such work as hazardous as many combatant duties.

One unit reported from New Guinea that a field worker fell through a camouflaged native trap (the pit type with sharpened stakes set vertically) while on a jungle trail. From now on the S.O.P. of this unit is to have a native precede any such "task force".

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Captain Kirkham, MC, Base K Malariaologist, conducted a malaria reconnaissance in the Ormoc area in December. His findings are quoted from his monthly report:

"Fifty children aged  $\frac{1}{2}$  to 14 years were examined for spleen size and thick blood film. Five, or 10%, showed enlarged spleens and all blood smears were negative. All these children lived in the city of Ormoc and the barrios of Ipil and Binoljo. No clinical schistosomiasis was encountered. Questioning of local physicians revealed that no cases of malaria or schistosomiasis had been recognized in the past 3 years."

The following units of Base K and their current activities are listed to show the extent and variety of work they are called upon to perform.

34th MSU at Baybay, surveying to Ormoc for mosquitos, snails, and doing blood and stool studies on the population.

41st MSU at San Joaqui doing mosquito, snail, and stool surveys south of Palo River.

205th MSU at Jaro, doing malaria and schistosome survey work and helping with civilian sanitation in the Jaro-Tunga area. Capt. Spicer to take command of the 97th MCU and operate both units together.

211th MSU at Tacloban, doing extensive mosquito, schistosome, and public health work for area north of Palo River.

66th MCU at Ormoc, doing mosquito and fly control for troops in that area.

90th MCU at Carigara, doing aedes control and conducting a public health campaign in that town.

91st MCU and 92nd MCU, at Tacloban, doing aedes control of city, public health measures for fly control, and extensive drainage of 49th General Hospital area.

93rd MCU at San Joaquin, doing drainage of hospital and other camp sites, and sanitation in Palo.

97th MCU at Tunga, Unit to move to Jaro, and Capt. Spicer of 205th MSU to be temporary Commanding Officer.

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Lieutenant Barksdale, Sn C, of the 19th Medical General Laboratory, has some interesting results in his summary of recent surveys on Leyte. The following report is one of the most interesting to date:

ANIMAL SURVEY, PALO

- Dog - Dipylidium caninum, Schistozoma, Ancylostoma.
- Dog - Schistosoma ova and Hookworm ova.
- Carabao - Fasciola and Fasciolopsis ova.
- Rooster - Hookworm rhabditiform larvae, Trichuris ova, Taenia ova.
- Carabao - Neg.
- Carabao - Fasciolopsis ova.
- Carabao - Neg.
- Dog - Hookworm ova.
- Carabao - Fasciolopsis ova.
- Horse - Hookworm ova.
- Carabao - Neg.
- Dog - Hookworm ova.
- Cow - Trichomonas.
- Duck - Neg.
- Dog - Trichuris, Hookworm, and Ascaris ova.
- Dog - Hookworm ova.
- Pig - Ascaris ova.
- Chicken - Hookworm ova.
- Horse - Neg.
- Chicken - Taenia ova.
- Goose - Neg.
- Dog - Hookworm and Ascaris ova.
- Carabao - Neg.
- Carabao - Neg.
- Carabao - Neg.
- Cat - Trichuris and Hookworm rhabditiform larvae.
- Chicken - Hookworm, Ascaris, and Pinworm ova.
- Dog - Hookworm, Ascaris, Pinworm ova.
- Dog - Hookworm ova.
- Dog - Schistosoma ova and Hookworm ova.
- Carabao liver - Adult Fasciola
  - Pig - E. coli troph, and cysts, Ascaris and Hookworm ova.
  - Pig - Ascaris ova, Coccidium ova, probably Eimeria.
  - Pig - Ascaris ova, Coccidium ova, probably Eimeria.
  - Pig - Ascaris ova.
  - Carabao - Neg.
- Carabao liver - Fasciola adults.
  - Dog - Hookworm ova.
- Carabao Duodenum - Neg.
  - Pig - Ascaris, well developed hookworm, Trichuris ova, Thorny Head Worm ova.
  - Pig - Ascaris, well developed Hookworm ova.
  - Pig - Ascaris embryonated (beat up) as well as fresh and unfertilized ova.
  - Pig - Ascaris ova, Trichuris ova, hookworm ova.

MISCELLANEOUS

Numerous Oncomelania found in Carabao wallow into which drains human latrines. Promiscuous defecation all around area. Nipa fronds, Coconuts, and Badiang Plants found throughout and contain Oncomelania.

Oncomelaniae found to be infected with cercariae upon crushing.

Human population immediately surrounding area was found to be infected with Schistosoma japonicum. Oncomelania also abundant among Badiang plants at edge of rice field. Oncomelania found to be abundant in rice field.

PERCENTAGE OF ENCOUNTERED PARASITES

	<u>Percentages</u>	<u>Numbers</u>
Roundworm	1.3%	236
Whipworm	80.5%	227
Hookworm	74.8%	210
Schistosomiasis japonicum	22.3%	64
E. coli Cysts	7.8%	22
E. coli Trophs	0.31%	1
Giardia lamblia Cysts	1.06%	3
E. nana Cysts	1.06%	3
E. nana Cysts	0.31%	1
T. hominis	1.41%	4

DISTRIBUTION OF PARASITIZED HOSTS

I

64 Positive for Schistosoma japonicum

In Town	28.1%
In Barrios	62.5%
Undetermined	9.3%
River Banks	0.0%

II

282 Positive for Parasites Other Than Schistosoma japonicum

In Town	66.51%
In Barrios	22.34%
Undetermined	6.73%
River Banks	3.5%

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The malaria units arriving and at work on Luzon by S plus 18 are:

<u>Control</u>	<u>Survey</u>
9	26
10	27
12	30
25	39
37	213
59	403
61	423
62	425
77	
99	
110	

\* ----- \* ----- \* ----- \* ----- \* ----- \*

Captain Kirkham reports the following rates are based on all admissions to hospitals under ASCOM control, and all admissions to quarters in ASCOM units. Some 6th Army cases admitted to Base K hospitals in the past week are included, otherwise the figures are reliable. Strengths are taken from ASCOM station list of 10 December. Figures are cases per 1000 men per annum.

	<u>Malaria</u>	<u>Dengue</u>	<u>FUO</u>
Week ending 11 Dec.		28.2	191.8
Week ending 8 Dec.	28.9	86.7	336.5
Week ending 15 Dec.	29.2	95.7	175.1
Week ending 22 Dec.	30.7	51.2	211.9

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Captain Bryan, Sn C, CO of the 114th MCU, who has had considerable experience working with DDT, offers the following information as a guide to those in need of such advice.

THE USE OF DDT EMULSION AS A MOSQUITO LARVICIDE

The product considered most satisfactory, using materials available in this theater, is an emulsion made of DDT in diesel oil and G.I. soap in water. The approximate proportions used are 75 to 77.5% Diesel Oil - DDT solution and 27.5 to 25% soap solution to make the stock emulsion. It has been necessary to vary these proportions slightly during the process of preliminary field tests in order to insure greater stability of the bulk product.

PREPARATION OF THE INGREDIENTS

1. Add 1 pound of DDT powder to 2 gallons of diesel oil #2 or its equivalent. The DDT powder should be weighed with reasonable accuracy, and the lumps well broken up before adding to the oil.

DDT goes into solution slowly and since 8% is very nearly a saturated solution it is necessary to stir the mixture at frequent intervals. During cool weather the DDT may not completely dissolve, however the residue should be so small as to make no difference in the results.

2. Add  $1\frac{1}{4}$  pounds of G.I. soap to 2 quarts of water. This amount of soap will go into solution easily when heated. If allowed to cool the solution will solidify to a jelly and must be reheated until thoroughly liquified before use.

PREPARATION OF THE EMULSION

The emulsion being tested at present in the field by this unit consists of 75% DDT in oil and 25% soap solution made up in 10 quart lots. The soap solution is first poured into a 12 quart G.I. can or similar container. The oil is then added slowly to the soap solution by one man while the soap and oil is stirred continuously by another.

A wire egg whip is used for stirring. If a whip is not available one may easily be made by bending four pieces of stiff wire about two feet long into loops and fastening the ends to a handle.

For best results the emulsion should be stirred slowly (about 90 revolutions per minute) until it is well thickened after which it should be whipped as thoroughly as possible.

USE OF THE EMULSION IN THE FIELD

For use in the field the stock emulsion has been put up in four ounce bottles, filling each bottle  $3/4$  full. At the time of filling the bottles, if the emulsion is still coarse, the bottles should be shaken vigorously for a few seconds to complete the emulsification. The bottled emulsion may be easily carried in a dispatch case or other container. In the field the contents of one bottle is stirred into 3 gallons of water in a knapsack sprayer. Since the emulsion may be stiff in stock form the remainder of the bottle containing the emulsion should be filled with water and thoroughly mixed before adding it to the sprayer. In this condition it should disperse readily in the water in the sprayer with a little stirring. The motion of the sprayer on the back of the person doing the spraying is sufficient to keep it dispersed.

The finished spray applied at the rate of approximately 30 gallons per acre of water surface will give a coverage of about 0.1 pound of DDT per acre. This amount has been found in previous tests in Panama and in the U.S. to be more than ample in other types of sprays for perfect to near perfect control.

On addition of the stock emulsion to the water in the sprayer a slight break will be noticed. If the emulsion is properly prepared this will not be enough to affect the results.

RESULTS OF PRELIMINARY TESTS

A test plot was selected near the camp in an area containing wheel ruts, man made holes and normal ground pools. A mixed population of Culicine and Anopheline larvae existed throughout the area at an average rate of 4 - 5 larvae per dip. Three sprayers of solution were prepared, and water from a foxhole, a muddy drainage wash and a ground pool was used respectively. The solution was applied on Monday, 27 November, 1944. A check four hours after application showed the pupae apparently unaffected. The early instar larvae had all been killed. A few late instar larvae were feebly active but so far none that most of them made no effort to go to the bottom when touched with the finger. A light rain had taken place within the four hour interval. A check on Friday, 1 December 1944 showed only a widely scattered population of first instar larvae, both Culicine and Anopheline. A sprayer with a fairly coarse nozzle was used in the above test.

In an area being covered by a Filipino laborer using a fine nozzle sprayer wheel ruts were selected having a heavy mixed population of all larval stages and pupae. The ruts were re-examined two hours later and all stages except the pupae had been killed. The pupae appeared unaffected and the following morning many were still active.

Field application was initiated before general larval counts could be made over the whole area, however it is believed that results will coincide with the checked tests.

REMARKS

This report is made on the basis of preliminary field tests only and experimentation is still being carried out. However, from present indications, larval control should be excellent using this emulsion.

Due to the lack of accurately standardized diesel oil and soap used in this preparation it is well to make up a small laboratory sample when using a new drum of oil or a new case of soap. In preparing a laboratory sample a 4 ounce bottle or a 50 cc mixing graduate is used. The soap and oil are measured into the container to be used and it is rocked back and forth until well thickened and then shaken vigorously. If it is shaken vigorously at first the air shaken into the liquid tends to prevent emulsification.

One lot of stock made up with soap of Australian manufacture was found to be unsatisfactory. On addition of the stock emulsion to water an oily curd rose to the top. The soap contained visible particles of unsaponified fat and was coarse and crystalline in texture. It is believed that the free fats combined with some of the diesel oil to form the curd.

Salt water or excessively hard water is an unsatisfactory diluent as the emulsion will break very rapidly on being added to it. Tests of the various water supplies should be made in the locality where the use of this spray is contemplated.

The finished spray should be mixed as it is used in the field as this is not a completely stable emulsion. Any spray left over at meal times or at the end of the day should be poured out and the sprayers refilled on resuming work. Sprayers should be emptied within 30 minutes to one hour.

Since a knapsack sprayer holds four gallons of water it will be used only 3/4 full. This is to prevent contaminating the person using the sprayer with DDT.

Sprayers having both fine and coarse nozzles may be used but a fine nozzle will give a more even coverage.

The residual effect of this preparation is probably of such short duration as to be of no value.

Acknowledgment is made to Capt. William C. McDuffie, Sn. C. for his preliminary laboratory work and advise on the preparation of the above described DDT-oil-soap emulsion.

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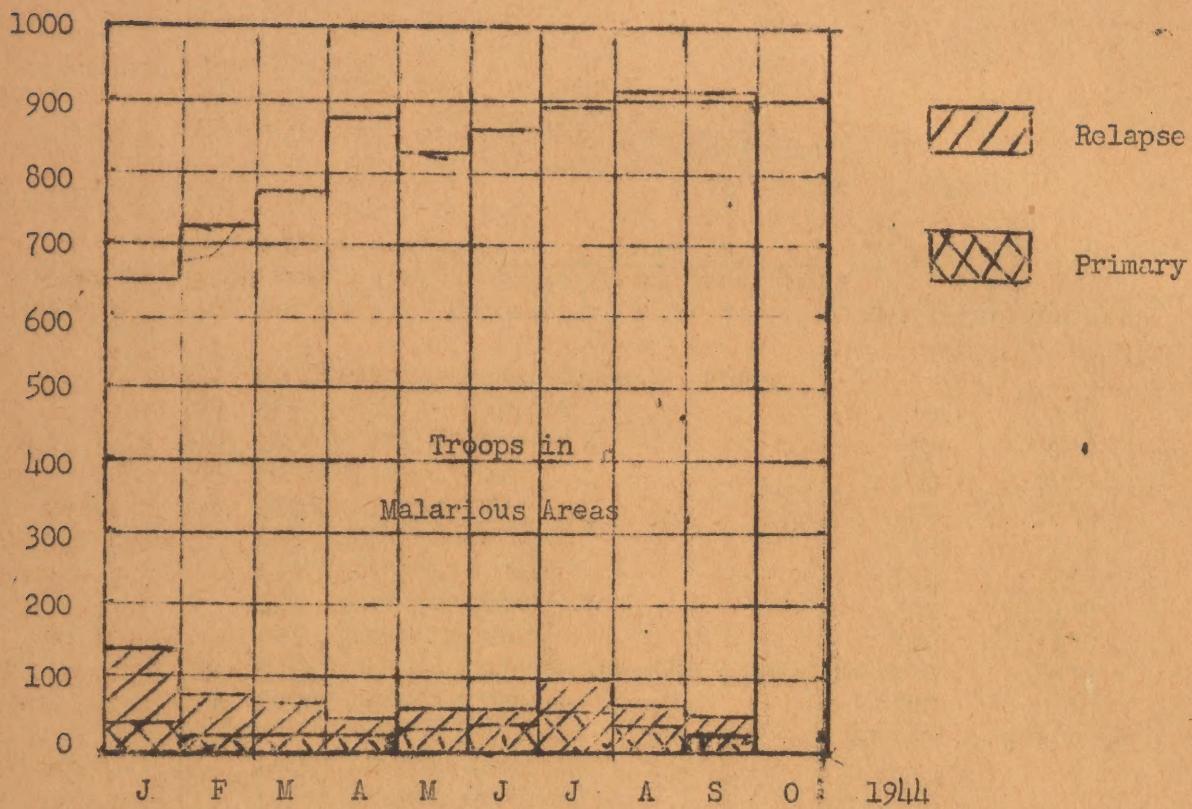
Capt. William J. Spicer, Sn C. CO of the 205th MSU reports finding the snail serving as secondary host for Schistosoma japonicum; was collected in rice fields between Alangalang and Jaro. None were found in the vicinity of Carigara. None of the few collected were found to be infected with the schistosome.

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SWPA MALARIA ATTACK RATES

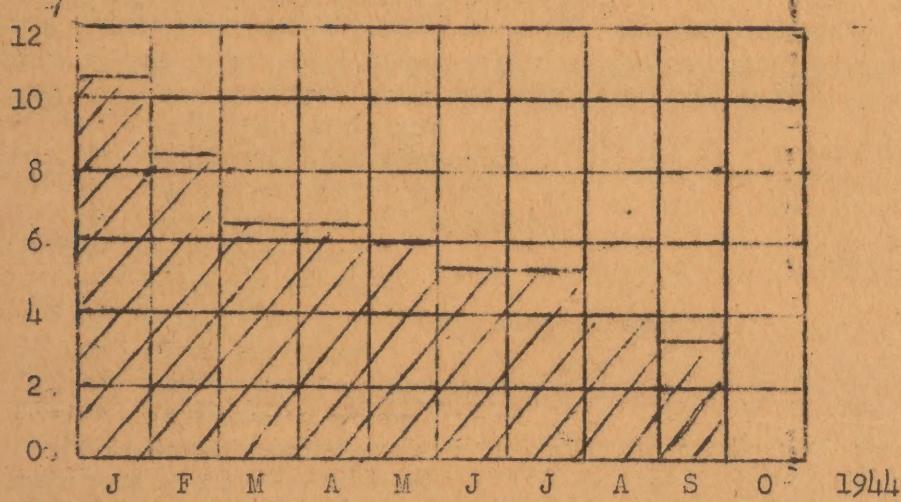
Per 1,000 per annum



(a) Strength based on station lists, USAFFE  
(b) Rates computed from WDMD 86 ab

PERCENTAGE OF DISEASE HOSPITAL BEDS OCCUPIED

BY MALARIA CASES IN SWPA



Capt. W. J. Spicer, Sn C, Co of the 205th MSU reports from Leyte "Five Anopheline species were collected with only one a known vector of malaria, A. minimus flavirostris. This species was collected along grassy banks of swift running streams in every instance. The first collection made 2 November, one kilometer north of Jaro and subsequent collections of this species in four other streams between Karp and Carogara. The other Anopheline species identified were A. pseudobarbirostris, A. barbirostris, A. gigas formosus and A. hyrcanus nigerrimus found along grassy banks of swift running streams, grass covered pools, grass covered swamps and rice fields."

The 41st MSU under the command of Captain Daniels, Sn C, arrived in Leyte to continue the fine work they've been doing, as shown by their latest report.

SUBJECT: Technical Report for Month of December.

3. During the month of December, comprehensive surveys of the following areas were completed: 8th Army Hq, 117th Station Hospital, and 126th General Hospital. 85 larval collections totaling 293 dips were made. Of the 626 mosquitoes taken, 116 were anophelines, and 510 were culicines. Species represented included the following.

- a. *Aedes albopictus*
- b. *Armigeres* species
- c. *Tripteroides bimaculipes*
- d. *Culex halifaxi*
- e. *Megarhinus splendens* (variety unknown)
- f. *Mansonia* species
- g. *Anopheles kochi*
- h. *Anopheles vagus* (variety)
- i. *Anopheles barbirostris*
- j. *Anopheles pseudobarbirostris*
- k. *Anopheles subpictus*

The above list was compiled from the total monthly collections. Average larval densities in the three unit areas surveyed was .36 anophelines per dip.

Culicine densities ranged from 0 to 1.73. Maximum number of larvae per dip was found in the 8th Army Area (173 per dip).

4. Two biting tests were run between the hours of 1800 and 2030 in the 126th General Hospital area. 26 adult culicines were taken and 1 anopheline. 22 of the culicines were females of the same species of *Mansonia*. The anopheline was identified as *Anopheles vagus*.

5. During the month a blood and stool examination of Palo school children, with ages ranging from 6 to 20, was partially completed. The results:

a. Blood smears			
(1) Total number examined	287		
(2) Total number containing parasites	0		
b. Stools		Number	Per cent
(1) Total number examined	242		
(2) Total number containing eggs (all types)	238	98.4	
(a) Hookworm eggs	116	48.3	
(b) Ascaris eggs	208	87.4	
(c) Trichuris eggs	181	75.9	
(d) Schistosma eggs	18	7.5	
(3) Single infections	46	19.0	
(4) Double infections	105	44.1	
(5) Triple infections	81	34.1	
(6) Quadruple infections	6	2.6	
(7) No <i>Endamoeba histolytica</i> detected			

6. A survey was started to determine the location and infection rate of the intermediate snail host of *Schistosoma japonicum*.

a. Collections were made at 8 localities between Palo and Alangalang.

	# of snails collected	# infected	per cent
(1) 1.3 miles west of Palo	106	6	5.6
(2) 1.5 miles west of Palo	65	7	10.8
(3) 2.0 miles west of Palo	90	10	11.1
(4) 2.1 miles west of Palo	70	2	2.8
(5) 6.5 miles west of Palo	100	6	6.0
(6) 6.9 miles west of Palo	60	0	0.0
(7) 7.5 miles west of Palo	100	2	2.0
(8) East edge of Alangalang	45	0	0.0

b. Army units in the vicinity of these infectious waters were notified.

c. There were dwellings near every collection point.

d. The snail (Oncomelania) prefers the shaded parts of sluggish streams or swampy waters. The snails were collected above the water surface on the bank or on floating debris.

e. Ten stools consisting of horse, cattle, carabao, and hog dung were taken from scattered localities in an attempt to find a reservoir host. No schistosome eggs were found.

f. At the request of the Base Malariaologist, and the Division Surgeon respectively, a snail survey was made of the 8th Army Hq Area, 9 miles south of Palo and the 38th Division Hq Area near Jaro. The snail (Oncomelania) was not found in either area.

7. A survey of the prisoners at the Base "K" POW Stockade has been partially completed. Examinations for intestinal and blood parasites have been made as follows:

a. Blood smears

(1) Total number examined	161
(2) Total containing parasites	0

b. Stools

	Number	per cent
(1) Total number examined	75	
(2) Total number containing eggs	31	41.3
(a) Hookworm eggs	14	18.0
(b) Ascaris eggs	17	22.7
(c) Trichuris eggs	4	5.3
(3) Single infections	27	87.4
(4) Double infections	4	12.9

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Captain Charles H. Daniels, Sn C, CO of the 41st MSU reports on breeding in the Pastrana area of Leyte.

1. From 30 December 1944 to 6 January 1945 a survey of mosquito breeding at Pastrana was conducted by the 41st Malaria Survey Unit. Pastrana is located about 9 miles south of Santa Fe.

2. Mosquito breeding was limited to ruts, coconuts, and to a lesser extent, creek pools. Anopheline breeding averaged 5.4 mosquitoes per dip; culicine breeding, 0.8 mosquitoes per dip.

3. A random collection of immature mosquitoes produced adults of the following identity:

a. Anopheles minimus. The chief vector of malaria in the Philippines. Found breeding in heavy grass vegetation along creek bank.

b. Anopheles vagus limosus. Of no importance as a carrier of malaria. Found breeding in ruts.

c. Anopheles kochi. Of no importance as a carrier of malaria. Found breeding in ruts.

d. Aedes albopictus. Carrier of dengue. A small, black, white-striped mosquito, with black and white banded legs. The most common day-biter in the area. Found breeding in coconuts.

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The 93rd Malaria Control Unit carried out a ditching program during December that was something new to them. The method decided upon was the use of dynamite. The proposed ditch was through a swamp some fifteen hundred feet long. The result desired was to dry up surface water and at the same time, lower water level as far as possible. After a few practice shots, it was determined that by placing two sticks of 60% dynamite to a hole, depth of hole not over fifteen inches with a distance of about four feet between shots, gave a ditch of the following dimensions:

Width - - - 4 Feet

Depth - - - 3 Feet

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Lt. Colonel Dy of G-5 GHQ contributed this bit of news for malaria investigators which we quote:

"AVIAN MALARIA IN THE PHILIPPINES"

"It will interest malariologists, parasitologists, entomologists and other investigators to know that there are materials in the Philippines with which chemotherapeutic, immunological and other researches in avian malaria may be conducted.

"Plasmodium gallinaceum Lupt, 1935, has been found in Philippine domestic chicken (Gallus gallus). Out of more than 500 chickens examined in Manila in 1939-1940, 11.5% were found positive for the plasmodium. The infection is usually fatal to chicks less than 3 weeks old; older chickens generally develop a mild parasitemia. The infection is known to be transmitted by Aedes mosquitoes.

"To malaria enthusiasts who have not yet delved into the romance of avian malaria, the following information is offered to start off with:

"1. Search for an infected specimen is done by random blood examination of chickens -- wherever you may find them. Stained or unstained (wet) blood preparations may be used.

"2. As soon as an infected chicken is found, 1 to 3 cc of its blood is injected intravenously or intramuscularly into another chicken to insure the propagation of the infection. Blood is drawn from one of the large neck veins by means of a 10-20 cc syringe and a gauge 23-25 needle, previously rinsed with sodium citrate solution to prevent clotting.

"3. Intramuscularly inoculated chickens usually become positive for plasmodia in 5 to 7 days. In order to draw blood to make blood smears, a small superficial wing vein at the distal end of the humerus is punctured with a fine needle.

"4. When 'clean' chicks are desired for sub-inoculation, it is best to procure those that have been kept in a mosquito-proof cage after hatching.

"Manwell's monograph on Bird Malaria contains a comprehensive discussion of what has been done in this field. It is interesting to note that the so-called exo-erythrocytic stages believed to be responsible for relapses in malaria, are frequently observed in the endothelial cells lining the capillaries of the brain, in the liver, lungs, bone marrow, etc. of infected chickens.

"The Philippine sparrow, Padda oryzivora Linn., locally known as "Maya", has been found infected with P. praecox and P. circumflexum. P. F. Russell's studies revealed a long list of birds naturally infected with plasmodia."

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The following extracts are from a monthly report of the 205th MSU under the command of Captain Spicer, Sn C. The report was rendered from Leyte.

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3. Five Anopheline species were collected with only one known vector of malaria, A. minimus flavirostris. This species was collected along grassy banks of swift running streams in every instance. The first collection made 2 November, one kilometer north of Jaro and subsequent collections of this species in four other streams between Jaro and Carigara. The other Anopheline species identified were A. pseudobarbirostris, A. barbirostris, A. gigas formosus and A. hyrcanus nigerinus found along grassy banks of swift running streams, grass covered pools, grass covered swamps and rice fields. No anopheline larvae were collected between Carigara and Pinamopoan.

7. The snail serving as secondary host for Schistosoma japonicum was collected in rice fields between Alangalang and Jaro. None were found in the vicinity of Carigara. None of the few collected were found to be infected with schistosome.

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The 6th MSU has received commendation for the fine sanitary work it has done. The following stool examination report is typical of this unit's work.

Stool examinations were taken on patients and school children of Tanauan. The results of these examinations are as follows:

Patients:

No.	Stools Examined	30
%	Schistosome ova	5%
%	Hookworm ova	55%
%	Whipworm ova	30%
%	Ascaris ova	35%
%	Double Infections	25%
%	Triple Infections	10%
%	Negative	20%
%	Positive	80%

School Children:

No.	Stools Examined	80
%	Schistosome ova	0.0%
%	Hookworm ova	22.5%
%	Whipworm ova	56.2%
%	Ascaris ova	71.2%
%	Double Infections	53.7%
%	Triple Infections	13.7%
%	Negative	15.0%
%	Positive	85.0%

\* ----- \*

The following anopheles have been collected to date (19 Nov 1944) by the 38th Malaria Survey Unit in the Leyte Valley:

1. Anopheles hyrcanus nigerimus Giles  
Common in stagnant and marshy water. Not a demonstrated vector in the Philippines.
2. Anopheles barbirostris van der Wulp  
Common in above habitats. Not a vector in the Philippines.
3. Anopheles mangyanus (Banks)  
In flowing stream at Tunga. Believed to be a vector in the Philippines.
4. Anopheles minimus flavirostris (Ludlow)  
In clear flowing streams at Santa Rosa and Tunga. The import it vector in the Philippines.
5. Anopheles maculatus Theobald  
In clear flowing stream at Tunga. An important vector in Malaya.
6. Anopheles kochi Donitz  
In stagnant, semi-shaded fox hole at Tacloban. In crab holes flooded with brackish water at Carigara. Not considered an important vector.
7. Anopheles ludlowi (Theobald)  
In flowing clear stream at Tunga. Not considered a vector.
8. Anopheles tessellatus Theobald  
Found in fox hole under house in Carigara. Not known to be a vector in the Philippines.
9. Anopheles vagus limnosus King  
Common in stagnant and marshy waters. Not considered to be a vector.

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The following extracts from reports submitted by the 6th MSU on schistosomiasis surveys should prove of interest to all -- it has unofficially been reported that several cases of this disease have occurred in American troops on Leyte which would indicate a possible hazard in some of the forward areas.

#### Habitats.

Where the snails did occur, they were in more or less permanent water in grassy pools or overgrown sloughs fed by small streams, sometimes in open, sometimes in shaded places. None were found in rivers, none in wells, and none in temporary rain pools. None were found in nipa swamps ~~except near~~ Palo, where there were a few in the upper edge of the nipa zone, apparently carried there by a small stream.

The Sixth Army-Tolosa Area is notable for the number of grassy and overgrown sloughs and swamps which it contains. However, snails of the genus *Oncomelania*, which carries human schistosomiasis in the Philippines, were found in only one place, about a mile north of the Sixth Army Area, in a grassy, shaded swamp. Too few individual snails were found to examine for infection rate.

#### Infection.

Various lots of *Oncomelania* were found infected with cercariae of *Schistosoma japonicum* in the Palo to Tolosa area, as follows:

<u>Place</u>	<u>Oncomelania examined</u>	<u>Number infected</u>	<u>Percentage infected</u>
Palo	60	2	3.0%
Palo	200	3	1.5%
Palo	109	2	20.0%

There were three areas in and around Palo where infected snails were found.

(Snails collected near Telegrafo were too few for examination)

This unit has promptly posted all water where *Oncomelania* have been found, "THIS WATER CONTAINS PARASITIC WORMS - KEEP OUT", and has contacted and warned all troop units camped in the vicinity of infected water. It is recommended that these measures be continued by Malaria Survey Units and others making further snail surveys.

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#### SURVEY AND CONTROL OFFICERS

#### ON LUZON

If you want information on any phase of Malaria in Pangasinan Province visit Bugallon Civilian Hospital and contact Dr. de Mira. There are many maps and records going back over ten years. Two field men have a combined experience of over 17 years in malaria. There are siphons near the area altho they are not working due to three years of neglect.

The following extract is quoted from a report of the 30th Malaria Survey Unit at APO 159.

"While working with the 7th Station Hospital Lt. Burrows, of the parasite section, discovered an infection of *Isospora hominis* in one of the American soldiers. This intestinal infection is so rare that only about 225 cases had been reported previously and none from New Guinea. Since then five more soldiers have been found to harbor this parasite. Captain L. A. Smith, of the 237th Station Hospital and Lt. Burrows have written up these cases for publication."

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DDT/Dusting Experiment

10% in Talc

by

The 31st Malaria Survey Unit  
Lt. Wayne L. Howe, Sn C, Commanding

Procedure:

A ready made 10% solution (Mixture) of DDT in talc was applied to the two streams by means of rotary hand dusters. Branch A was dusted on March 14. Branch B was dusted on March 13. It was intended that the operators of the dusters wade the streams, but the muddy bottom and dense overhanging vegetation made this impossible and it was necessary to follow at the edge of the bank, poking the nozzle into any openings that were present. It is estimated that 70% of the water surface of the test area was covered. It was noted that a heavy dosage of dust on a given surface formed a crust which immediately broke up into small islands which tended to be drawn to the middle of the stream and carried away. Approximately 3 1/3 pounds of 10% DDT or 0.3 pounds of pure DDT was used on both streams.

The larva check stations were set up 250 ft. apart and dusting was done between stations 1 and 5 on Branch A and between stations 1 and 5 on Branch B. Thus, 1000 ft. were dusted on each branch. The branches are of the streams which runs through San Jose into the Bussanga River and are located about 1 mile NE of San Jose. The branches at the time of dusting were about equal in average depth, width, and volume of flow. These approximate figures are: 8 inches deep, 2 ft. wide, and 6 cu. ft. /minute.

Summary of Results DDT Dusting Experiment

Total dips	Branch A				Branch B			
	8 da before		2 da after		6 da after		7 da before	
	An.	Cu.	An.	Cu.	An.	Cu.	An.	Cu.
Total larvae	189	2	32	0	176	1	63	3
Ave larvae per dip	3.4	0.1	0.8	0	4.5	0.1	1.8	0.8
% Reduction			76	100*	neg	**		
							72	12
							50	87

\* Not Significant

\*\* Undetermined

Discussion:

The chart indicates only partial control therefore this method as a means for controlling Anopheles minimus flavirostris under the conditions found at Mindoro is not recommended. Other disadvantages are difficulty in approach to streams and unfavorable winds.

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Rice Paddy Test

Done By

67th Malaria Control Det.

Captain Cross reports an interesting experiment made at Palawan, P.I. The following is quoted from his April report.

"At the request of officials of the Iwahig Penal Colony, a test was made on rice paddies using both 5% DDT solution in Diesel Oil and 1% Paris Green in charcoal dust, as larvicides. The DDT was applied at the rate of one quart of solution per acre and the Paris Green at the rate of two pounds per acre. A complete kill was obtained in both cases with first instar larvae appearing in six days. After three weeks no damage to the rice plants was observed.

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## MALARIA IN CIVILIANS OF CAPAS, TARLAG, LUZON.

One slide examination of 98 elementary school children and 100 residents.

Giemsa stained slides of thick blood films gave the following results:

## HOUSE-TO-HOUSE SURVEY

<u>Age Group</u>	<u>No. Examined</u>	<u>No. Positive</u>	<u>% Positive</u>	<u>Species Distribution</u>			
				<u>Pv.</u>	<u>Pf.</u>	<u>Pm.</u>	<u>Mixed</u>
1-6 incl.	20	2	10.0	1		1	
7-12 incl.	25	3	12.0	1		1	1(Pf-Pv)
13-20 incl.	24	3	12.5	1	1		1(Pf-Pv)
21 and over	31	6	19.4	3	3		
Total	100	14	14.0	6	4	2	2

## ELEMENTARY SCHOOL SURVEY

<u>Age Group</u>	<u>No Examined</u>	<u>No. Positive</u>	<u>% Positive</u>	<u>Species Distribution</u>			
				<u>Pv.</u>	<u>Pf.</u>	<u>Pm.</u>	<u>Mixed</u>
1-6 incl.	1	0	0.0				
7-12 incl.	95	9	9.5	4	3	2	
13-20 incl.	2	1	50.0			1	
Total	98	10	10.2	4	3	3	

Of the 98 pupils examined for enlarged spleens, five were found positive (1 P.D.I., 4 No. 1). Of these, four were positive in the blood examination.

## Discussion:

The survey was purposely divided into two parts in order to have a basis for comparing the results obtained by examining school children only and those secured in a house-to-house survey. The total rate obtained in the house-to-house survey is somewhat higher (3.8%) than the rate among school children and this appears to be due to the rather high incidence among older people who are not encountered in school surveys. Four of the six infected individuals in the "21 and over" age group were 45 years old or older. The first three age groups in both surveys provided very similar results, 10.2 percent being found positive in the school survey and 11.6 percent in the house-to-house survey. The species and incidence of plasmodia encountered in these age groups is also strikingly similar in both surveys, especially when *P. malariae* is a relatively rare species in the Philippines according to Dr. E. Y. Garcia.

These results, while indicative of a considerable seed-bed of malaria, can not be interpreted as reflecting the rate of malaria transmission in the vicinity of Capas as most of the normal inhabitants evacuated to the hills during the Japanese retreat. At present the population is also augmented by an influx of barrio people seeking refuge from Japanese raiding parties. Both of these factors influence the results in favor of a high malaria rate.

The work above was done by the 422nd Medical Composite Unit (Malaria Survey) under the direction of Captain Robert T. Stevenson, Sn C, Parasitologist of the unit.

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